

Exposure of cells to \*extremely\* \*low\*-\*frequency\* \*electromagnetic\*  
fields: Relationship to \*malignancy\*?

MEDICAL DESCRIPTORS:

theoretical study; human; nonhuman; \*review\*

SECTION HEADINGS:

016 \*Cancer\*  
027 Biophysics, Bioengineering and Medical Instrumentation  
029 Clinical and Experimental Biochemistry

?ds

Set	Items	Description
S1	0	(NON-THERMAL (W) FIELDS) (S) ((GENETIC OR GENE OR DNA) (S) (MODIFICATION OR MODIFIED))
S2	233	(STATIC (W) (FIELDS OR ELECTROMAGNETIC))
S3	447	(EXTREMELY (W) LOW (W) FREQUENCY (W) ELECTROMAGNETIC)
S4	680	S2 OR S3
S5	0	S4 (S) ((GENE OR GENETIC OR DNA) (W) (MODIFICATION OR MODIFIED))
S6	0	S4 AND ((GENE OR GENETIC OR DNA) (W) (MODIFICATION OR MODIFIED))
S7	194	S4 AND (APOPTOSIS OR CANCER OR MALIGNANCY)
S8	0	S7 AND (NON-THERMAL)
S9	38	S7 AND REVIEW
S10	24	RD (unique items)

?logoff

23jan04 16:44:47 User259876 Session D586.2  
\$2.50 0.782 DialUnits File155  
\$1.05 5 Type(s) in Format 3  
\$1.05 5 Types  
\$3.55 Estimated cost File155  
\$2.23 0.756 DialUnits File159  
\$0.26 1 Type(s) in Format 3  
\$0.26 1 Types  
\$2.49 Estimated cost File159  
\$5.38 0.960 DialUnits File5  
\$8.75 5 Type(s) in Format 3  
\$8.75 5 Types  
\$14.13 Estimated cost File5  
\$8.14 0.830 DialUnits File73  
\$35.10 13 Type(s) in Format 3  
\$35.10 13 Types  
\$43.24 Estimated cost File73  
OneSearch, 4 files, 3.328 DialUnits FileOS  
\$1.40 TELNET  
\$64.81 Estimated cost this search  
\$65.17 Estimated total session cost 3.421 DialUnits

### Status: Signed Off. (6 minutes)

### Status: Path 1 of [Dialog Information Services via Modem]

### Status: Initializing TCP/IP using (UseTelnetProto 1 ServiceID pto-dialog)  
Trying 31060000009999...Open

DIALOG INFORMATION SERVICES

PLEASE LOGON:

\*\*\*\*\* HHHHHHHH SSSSSSSS?

### Status: Signing onto Dialog

\*\*\*\*\*

ENTER PASSWORD:

\*\*\*\*\* HHHHHHHH SSSSSSSS? \*\*\*\*\*

Welcome to DIALOG

### Status: Connected

Dialog level 03.06.02D

Last logoff: 21jan04 14:22:31

Logon file001 23jan04 16:39:13

\*\*\* ANNOUNCEMENT \*\*\*

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--File 654 - US published applications from March 15, 2001 to the present are now online. Please see HELP NEWS 654 for details.

\*\*\*

--File 581 - The 2003 annual reload of Population Demographics is complete. Please see Help News581 for details.

\*\*\*

--File 990 - NewsRoom now contains February 2003 to current records.  
File 992 - NewsRoom 2003 archive has been newly created and contains records from January 2003. The oldest months's records roll out of File 990 and into File 992 on the first weekend of each month.  
To search all 2003 records BEGIN 990, 992, or B NEWS2003, a new OneSearch category.

\*\*\*

--Connect Time joins DialUnits as pricing options on Dialog.  
See HELP CONNECT for information.

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--SourceOne patents are now delivered to your email inbox as PDF replacing TIFF delivery. See HELP SOURCE1 for more information.

\*\*\*

--Important news for public and academic libraries. See HELP LIBRARY for more information.

\*\*\*

--Important Notice to Freelance Authors--  
See HELP FREELANCE for more information

\*\*\*

NEW FILES RELEASED

\*\*\*DIOGENES: Adverse Drug Events Database (File 181)

\*\*\*Emergency Room (File 454), Hospital Inpatient Profiles (File 462),  
and Hospital Outpatient Profiles (File 463)

\*\*\*World News Connection (File 985)

\*\*\*Dialog NewsRoom - 2003 Archive (File 992)

\*\*\*TRADEMARKSCAN-Czech Republic (File 680)

\*\*\*TRADEMARKSCAN-Hungary (File 681)

\*\*\*TRADEMARKSCAN-Poland (File 682)

\*\*\*

UPDATING RESUMED

\*\*\*

RELOADED

\*\*\*Population Demographics -(File 581)

\*\*\*CLAIMS Citation (Files 20-222)

REMOVED

\*\*\*

>>> Enter BEGIN HOMEBASE for Dialog Announcements <<<  
>>> of new databases, price changes, etc. <<<  
\*\*\*\*

KWIC is set to 50.

HIGHLIGHT set on as '\*'

\* \* \* ALL NEW CURRENT YEAR RANGES HAVE BEEN \* \* \*

\* \* \* INSTALLED \* \* \*

File 1:ERIC 1966-2004/Jan 20

(c) format only 2004 The Dialog Corporation

Set	Items	Description
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Cost is in DialUnits

?b 155, 159, 5, 73

23jan04 16:39:25 User259876 Session D586.1

\$0.32 0.093 DialUnits File1

\$0.32 Estimated cost File1

\$0.04 TELNET

\$0.36 Estimated cost this search

\$0.36 Estimated total session cost 0.093 DialUnits

SYSTEM:OS - DIALOG OneSearch

File 155:MEDLINE(R) 1966-2004/Jan W3

(c) format only 2004 The Dialog Corp.

**\*File 155: Medline is updating again (12-22-2003).**

Please see HELP NEWS 154, for details.

File 159:Cancerlit 1975-2002/Oct

(c) format only 2002 Dialog Corporation

**\*File 159: Cancerlit ceases updating with immediate effect.**

Please see HELP NEWS.

File 5:Biosis Previews(R) 1969-2004/Jan W3

(c) 2004 BIOSIS

File 73:EMBASE 1974-2004/Jan W3

(c) 2004 Elsevier Science B.V.

**\*File 73: New prices as of 1-1-04 per information provider request. See ?RATES 73**

Set	Items	Description
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?s (non-thermal (w) fields) (s) ((genetic or gene or DNA) (s) (modification or modified))

7 NON-THERMAL

163838 FIELDS

1505233 GENETIC

2400133 GENE

2510069 DNA

306914 MODIFICATION

489151 MODIFIED

S1 0 (NON-THERMAL (W) FIELDS) (S) ((GENETIC OR GENE OR DNA)  
(S) (MODIFICATION OR MODIFIED))

?s (static (w) (fields or electromagnetic))

73269 STATIC

163838 FIELDS

31842 ELECTROMAGNETIC

S2 233 (STATIC (W) (FIELDS OR ELECTROMAGNETIC))

?s (extremely (w) low (w) frequency (w) electromagnetic)

201361 EXTREMELY

2509451 LOW

940477 FREQUENCY

31842 ELECTROMAGNETIC

S3 447 (EXTREMELY (W) LOW (W) FREQUENCY (W) ELECTROMAGNETIC)  
 ?s s2 or s3  
 233 S2  
 447 S3  
 S4 680 S2 OR S3  
 ?s s4 (s) ((gene or genetic or DNA) (w) (modification or modified))  
 Processing  
 680 S4  
 2400133 GENE  
 1505233 GENETIC  
 2510069 DNA  
 306914 MODIFICATION  
 489151 MODIFIED  
 S5 0 S4 (S) ((GENE OR GENETIC OR DNA) (W) (MODIFICATION OR  
 MODIFIED))  
 ?s s4 and ((gene or genetic or DNA) (w) (modification or modified))  
 680 S4  
 2400133 GENE  
 1505233 GENETIC  
 2510069 DNA  
 306914 MODIFICATION  
 489151 MODIFIED  
 12014 ((GENE OR GENETIC) OR DNA) (W) (MODIFICATION OR MODIFIED)  
 S6 0 S4 AND ((GENE OR GENETIC OR DNA) (W) (MODIFICATION OR  
 MODIFIED))  
 ?s s4 and (apoptosis or cancer or malignancy)  
 680 S4  
 280915 APOPTOSIS  
 2357607 CANCER  
 167083 MALIGNANCY  
 S7 194 S4 AND (APOPTOSIS OR CANCER OR MALIGNANCY)  
 ?s s7 and (non-thermal)  
 194 S7  
 7 NON-THERMAL  
 S8 0 S7 AND (NON-THERMAL)  
 ?s s7 and review  
 194 S7  
 1672912 REVIEW  
 S9 38 S7 AND REVIEW  
 ?rd  
 ...completed examining records  
 S10 24 RD (unique items)  
 ?t s10/3,k/all

10/3,K/1 (Item 1 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

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11315420 98194861 PMID: 9535213

**Biological responses to electromagnetic fields.**

Lacy-Hulbert A; Metcalfe J C; Hesketh R

Department of Biochemistry, University of Cambridge, England.  
 a.lacy-hulbert@ucl.ac.uk

FASEB journal - official publication of the Federation of American  
 Societies for Experimental Biology (UNITED STATES) Apr 1998, 12 (6)  
 p395-420, ISSN 0892-6638 Journal Code: 8804484

Document type: Journal Article; Review; Review, Academic

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

Electrification in developed countries has progressively increased the mean level of \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields (ELF-EMFs) to which populations are exposed; these humanmade fields are substantially above the naturally occurring ambient electric and magnetic fields of approximately 10(-4) Vm(-1) and approximately 10(-13) T, respectively. Several epidemiological studies have concluded that ELF-EMFs

may be linked to an increased risk of \*cancer\*, particularly childhood leukemia. These observations have been reinforced by cellular studies reporting EMF-induced effects on biological systems, most notably on the activity of components...

... Many of the most well-defined effects have come from gene expression studies; several attempts have been made recently to repeat these key findings. This \*review\* analyses these studies and summarizes other reports of major cellular responses to EMFs and the published attempts at replication. The opening sections discuss quantitative aspects...

10/3,K/2 (Item 2 from file: 155)

DIALOG(R) File 155:MEDLINE(R)

(c) format only 2004 The Dialog Corp. All rts. reserv.

10901490 97253463 PMID: 9098906

**Need for a European approach to the effects of \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields on \*cancer\* . ELF-EMF European Feasibility Study Group.**

Scandinavian journal of work, environment & health (FINLAND) Feb 1997,

23 (1) p5-14, ISSN 0355-3140 Journal Code: 7511540

Document type: Journal Article; Review; Review, Tutorial

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**Need for a European approach to the effects of \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields on \*cancer\* . ELF-EMF European Feasibility Study Group.**

BACKGROUND: A European feasibility study on environmental exposure to \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields (ELF-EMF) and \*cancer\* was conducted. The study was motivated by public health concern about possible adverse health effects associated with ELF-EMF exposure. METHODS: A \*review\* of completed research in Europe was conducted. Information on the methods and accessibility of new epidemiologic studies were requested and reviewed. RESULTS: Eight studies on...

... in progress. Although there is no known mechanism by which electric or magnetic fields of this frequency could play a role in the development of \*cancer\* or other adverse health effects, the results of the studies conducted so far provide some support for the hypothesis that they are associated with the...

10/3,K/3 (Item 3 from file: 155)

DIALOG(R) File 155:MEDLINE(R)

(c) format only 2004 The Dialog Corp. All rts. reserv.

10440323 96246998 PMID: 8704854

**Occupational risk factors for female breast \*cancer\*: a \*review\*.**

Goldberg M S; Labreche F

Public Health Department, Maisonneuve-Rosemont Hospital, Montreal, Quebec, Canada.

Occupational and environmental medicine (ENGLAND) Mar 1996, 53 (3)

p145-56, ISSN 1351-0711 Journal Code: 9422759

Document type: Journal Article; Review; Review Literature

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**Occupational risk factors for female breast \*cancer\*: a \*review\*.**

OBJECTIVES: Although progress has been made in identifying personal risk factors and in improving treatment for female breast \*cancer\*, incidence rates continue to increase. With women now occupying a sizable fraction of the workforce, it is worth inquiring whether there are occupational risk factors for breast \*cancer\*. This is a \*review\* of occupational studies on female breast \*cancer\* . METHODS: Suitable reports and published articles

with associations of female breast \*cancer\* and occupation were identified from technical reports, by searching the MEDLINE bibliographic data base, and by reviewing each paper on \*cancer\* that was published in 20 major journals during the period from about 1971-94. RESULTS: A total of 115 studies were identified; 19 studies relied...

... an association with employment in the pharmaceutical industry and among cosmetologists and beauticians. Associations were also found for chemists and occupations with possible exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields, but potential methodological weaknesses preclude drawing any definite conclusions. There was little support for increased risks among textiles workers, dry cleaning workers, and nuclear...

...CONCLUSIONS: Few high quality occupational studies directed specifically toward women have been carried out to allow the unambiguous identification of occupational risk factors for breast \*cancer\*. It is suggested that investigations that account for non-occupational risk factors and that assess exposure in a more detailed way be carried out. One...

10/3,K/4 (Item 4 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

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09646846 21435062 PMID: 11550314

**\*Extremely\* \*low\* \*frequency\* \*electromagnetic\* fields (EMF) and brain \*cancer\* in adults and children: \*review\* and comment.**

Gurney J G; van Wijngaarden E

Division of Epidemiology/Clinical Research, Department of Pediatrics, School of Medicine, University of Minnesota, Minneapolis, MN 55455, USA.

Neuro-oncology (United States) Jul 1999, 1 (3) p212-20, ISSN 1522-8517 Journal Code: 100887420

Document type: Journal Article; Review; Review, Tutorial

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

**\*Extremely\* \*low\* \*frequency\* \*electromagnetic\* fields (EMF) and brain \*cancer\* in adults and children: \*review\* and comment.**

Epidemiologic and experimental research on the potential carcinogenic effects of \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields (EMF) has now been conducted for over two decades. \*Cancer\* epidemiology studies in relation to EMF have focused primarily on brain \*cancer\* and leukemia, both from residential sources of exposure in children and adults and from occupational exposure in adult men. Because genotoxic effects of EMF have not been shown, most recent laboratory research has attempted to show biological effects that could be related to \*cancer\* promotion. In this report, we briefly \*review\* residential and occupational EMF studies on brain \*cancer\*. We also provide a general \*review\* of experimental studies as they relate both to the biological plausibility of an EMF-brain \*cancer\* relation and to the insufficiency of such research to help guide exposure assessment in epidemiologic studies. We conclude from our \*review\* that no recent research, either epidemiologic or experimental, has emerged to provide reasonable support for a causal role of EMF on brain \*cancer\*.

10/3,K/5 (Item 5 from file: 155)

DIALOG(R)File 155:MEDLINE(R)

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07186397 92048744 PMID: 1943872

**A \*review\* of \*cancer\* induction by \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields. Is there a plausible mechanism?**

Goldberg R B; Creasey W A

Information Ventures Inc., Philadelphia, PA 19102.

Medical hypotheses (ENGLAND) Jul 1991, 35 (3) p265-74, ISSN 0306-9877 Journal Code: 7505668

Document type: Journal Article; Review; Review, Tutorial  
Languages: ENGLISH  
Main Citation Owner: NLM  
Record type: Completed

**A \*review\* of \*cancer\* induction by \*extremely\* \*low\* \*frequency\*  
\*electromagnetic\* fields. Is there a plausible mechanism?**

... body of epidemiological evidence suggests an association between residential or occupational exposure to extremely low frequency (ELF) electromagnetic fields (EMF) and an increased incidence of \*cancer\* in children and adults. Experimental studies at the whole-animal and cellular level are ambiguous; bioeffects suggestive of a carcinogenic effect have been reported, but...

... disruption of hormonal and immune system tumor control mechanisms. We discuss the implications of epidemiologic and experimental results in the context of hypothetical mechanisms of \*cancer\* induction, and suggest experiments likely to help define putative EMF hazards.

10/3,K/6 (Item 1 from file: 159)

DIALOG(R)File 159:Cancerlit

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02647346 20360110 PMID: 10899776

**Human health consequences of environmentally-modulated gene expression:  
potential roles of ELF-EMF induced epigenetic versus mutagenic mechanisms  
of disease.**

Trosko J E

Department of Pediatrics and Human Development, Michigan State  
University, East Lansing 48824, USA. trosko@pilot.msu.edu

Bioelectromagnetics (UNITED STATES) Jul 2000, 21 (5) p402-6, ISSN  
0197-8462 Journal Code: 8008281

Document Type: Journal Article; Review; Review, Tutorial

Languages: ENGLISH

Main Citation Owner: NLM

Record type: Completed

In order to determine if there might be biological and health consequences after exposures to \*extremely\*-\*low\* \*frequency\*  
\*electromagnetic\* fields (ELF-EMF), either experimentally or epidemiologically, mechanistic understanding of the potential means by which any environmental agent can affect cells in a multicellular organism has to be reviewed. The goal of this limited \*review\* is to demonstrate that, while the prevailing paradigm of the environmentally-induced acute and chronic diseases involves either cell killing (cytotoxicity) or gene/chromosome mutations...

... regular exposures to be effective. Ultimately, epigenetic toxicants affect one of four potential cell states, namely alteration of cell proliferation, cell differentiation, programmed cell death (\*apoptosis\*) or adaptive responses of differentiated cells. Copyright 2000 Wiley-Liss, Inc.

10/3,K/7 (Item 1 from file: 5)

DIALOG(R)File 5:Biosis Previews(R)

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0013501242 BIOSIS NO.: 200200094753

**Do cocarcinogenic effects of ELF electromagnetic fields require repeated  
long-term interaction with carcinogens? Characteristics of positive  
studies using the DMBA breast \*cancer\* model in rats**

AUTHOR: Loescher W (Reprint)

AUTHOR ADDRESS: Department of Pharmacology, Toxicology and Pharmacy, School  
of Veterinary Medicine, Buenteweg 17, D-30559, Hannover, Germany\*\*Germany

JOURNAL: Bioelectromagnetics 22 (8): p603-614 December, 2001 2001

MEDIUM: print

ISSN: 0197-8462

DOCUMENT TYPE: Article; Literature Review  
RECORD TYPE: Abstract  
LANGUAGE: English

**Do cocarcinogenic effects of ELF electromagnetic fields require repeated long-term interaction with carcinogens? Characteristics of positive studies using the DMBA breast \*cancer\* model in rats**

...ABSTRACT: has been evaluated worldwide in diverse animal model systems. Though most results have been negative, weakly positive or equivocal results have been reported in several \*cancer\* models, including the rat DMBA (7,12-dimethylbenz(a)anthracene) model of mammary \*cancer\*. Based on the experimental conditions used in studies in which cocarcinogenic effects of ELF MF were found, it was recently proposed that MF exposure may...

...exposed to both MF and carcinogen during an extended period of tumor development, i.e., when the carcinogen is given repeatedly during MF exposure. This \*review\* summarizes a series of experiments from our group, showing cocarcinogenic MF effects in the DMBA breast \*cancer\* model in rats, to test whether the above proposal is confirmed by existing data. Flux densities of 50 or 100 µT significantly increased the growth...

...design and experimental factors are identified that seem to be critical for the detection of cocarcinogenic effects of MF exposure in the rat DMBA mammary \*cancer\* model. These include the rat subline used, the dose of DMBA, the duration of MF exposure, the flux density, the background (sham control) tumor incidence...

DESCRIPTORS:

DISEASES: breast \*cancer\*--...

...mammary \*cancer\*--

MISCELLANEOUS TERMS: ...\*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields {ELF electromagnetic fields...

...Literature \*Review\*

10/3,K/8 (Item 2 from file: 5)  
DIALOG(R)File 5:Biosis Previews(R)  
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0012990304 BIOSIS NO.: 200100162143

**Exposure to electromagnetic fields and \*cancer\*]**

ORIGINAL LANGUAGE TITLE: Esposizione ad ELF-EMF e tumori

AUTHOR: Del Prete U (Reprint); Attena F

AUTHOR ADDRESS: Istituto di Igiene e Medicina Preventiva, II Università degli Studi di Napoli, Via L. Armanni 5, 80138, Napoli, Italy\*\*Italy

JOURNAL: Igiene Moderna 112 (4): p1423-1443 Ottobre, 1999 1999

MEDIUM: print

ISSN: 0019-1655

DOCUMENT TYPE: Article

RECORD TYPE: Abstract

LANGUAGE: Italian

**Exposure to electromagnetic fields and \*cancer\*]**

ABSTRACT: A \*review\* on cancerogenic effects of residential and occupational exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* field (ELF-EMF) was conducted. The literature on residential exposure suggests hypotheses of association especially for leukemia and brain tumors, both in adult and children; there is some evidence of association but data are not conclusive. The risk of \*cancer\* is slightly more evident in occupational exposure but, in this case, data are very controversial. The difficult drawing any definitive conclusion is due mainly to...



...biases, role of chance, weak evidence of causal criteria and, above all, difficult exposure measurement. In conclusion, the putative causal relationship between ELF-EMF and \*cancer\* needs further researches to better evaluate its Public Health impact.

DESCRIPTORS:

...DISEASES: \*cancer\*--

10/3,K/9 (Item 3 from file: 5)

DIALOG(R)File 5: Biosis Previews(R)

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0010922648 BIOSIS NO.: 199799556708

**Need for a European approach to the effects of \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields on \*cancer\***

AUTHOR: Ahlbom A; Alexander F; Draper G; Casteleyn E; Clavel J; Katsuoyanni K; Petridou E; Kogevinas M; McKinlay A; Michaelis J; Olsen J; Roman E; Salvan A; Tynes T; Verkasalo P

AUTHOR ADDRESS: Dr Kleaj Katsuoyanni, Dep. Hygiene Epidemiology, Univ.

Athens, Med. Sch., 75 Mikras Asias str., 115 27 Athens, Greece\*\*Greece

JOURNAL: Scandinavian Journal of Work Environment and Health 23 (1): p5-14  
1997 1997

ISSN: 0355-3140

DOCUMENT TYPE: Article

RECORD TYPE: Abstract

LANGUAGE: English

**Need for a European approach to the effects of \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields on \*cancer\***

ABSTRACT: Background. A European feasibility study on environmental exposure to \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields (ELF-EMF) and \*cancer\* was conducted. The study was motivated by public health concern about possible adverse health effects associated with ELF-EMF exposure. Methods. A \*review\* of completed research in Europe was conducted. Information on the methods and accessibility of new epidemiologic studies were requested and reviewed. Results. Eight studies on...

...in progress. Although there is no known mechanism by which electric or magnetic fields of this frequency could play a role in the development of \*cancer\* or other adverse health effects, the results of the studies conducted so far provide some support for the hypothesis that they are associated with the...

DESCRIPTORS:

MISCELLANEOUS TERMS: ...\*CANCER\*; ...

...\*EXTREMELY\* \*LOW\*-\*FREQUENCY\* \*ELECTROMAGNETIC\* FIELDS

10/3,K/10 (Item 4 from file: 5)

DIALOG(R)File 5: Biosis Previews(R)

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0010283315 BIOSIS NO.: 199698751148

**Electromagnetic fields and childhood \*cancer\*: state of research in epidemiology**

AUTHOR: Coste D (Reprint); Moutet J P; Bernard J L

AUTHOR ADDRESS: Registre des Cancers de l'Enfant Provence-Alpes-Cote d'Azur et Corse, Faculte de Medecine, F 13385 Marseille Cedex 05, France\*\*France

JOURNAL: Revue d'Epidemiologie et de Sante Publique 44 (1): p80-92 1996  
1996

ISSN: 0398-7620

DOCUMENT TYPE: Article; Literature Review

RECORD TYPE: Abstract

LANGUAGE: French

**Electromagnetic fields and childhood \*cancer\*: state of research in epidemiology**

...ABSTRACT: manner to take into account all the potential confounders. So even significant associations do not imply their causality, all the more as the carcinogenicity of \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields, although biologically conceivable, has never been experimentally proven. Today it is impossible to claim or invalidate the influence of residential magnetic fields in the genesis of childhood \*cancer\*. Setting up of new epidemiological studies based on large number of cases issued from population based registries and conducted with a best defined methodology seems...

**DESCRIPTORS:**

MISCELLANEOUS TERMS: ...Literature \*Review\*

10/3,K/11 (Item 5 from file: 5)  
DIALOG(R)File 5:Biosis Previews(R)  
(c) 2004 BIOSIS. All rts. reserv.

0006470402 BIOSIS NO.: 198937048151

**\*EXTREMELY\* \*LOW\* \*FREQUENCY\* \*ELECTROMAGNETIC\* FIELDS AS POSSIBLE  
PROMOTERS OF CARCINOGENESIS**

**BOOK TITLE: WEISBURGER, E. K. (ED.). \*CANCER\* GROWTH AND PROGRESSION, VOL. 2. MECHANISMS OF CARCINOGENESIS. X+199P. KLUWER ACADEMIC PUBLISHERS: DORDRECHT, NETHERLANDS; BOSTON, MASSACHUSETTS, USA. ILLUS**

**AUTHOR: WERTHEIMER N (Reprint)**

**AUTHOR ADDRESS: 1330 FIFTH ST, BOULDER, CO 80302, USA\*\*USA  
p188-190 1988**

**ISBN: 0-89838-991-7 (VOL. 2); 0-89838-989-5 (SET)**

**DOCUMENT TYPE: Book**

**RECORD TYPE: Citation**

**LANGUAGE: ENGLISH**

**\*EXTREMELY\* \*LOW\* \*FREQUENCY\* \*ELECTROMAGNETIC\* FIELDS AS POSSIBLE  
PROMOTERS OF CARCINOGENESIS**

**BOOK TITLE: WEISBURGER, E. K. (ED.). \*CANCER\* GROWTH AND PROGRESSION, VOL. 2. MECHANISMS OF CARCINOGENESIS. X+199P. KLUWER ACADEMIC PUBLISHERS: DORDRECHT, NETHERLANDS; BOSTON, MASSACHUSETTS, USA. ILLUS**

**DESCRIPTORS: \*REVIEW\* HUMAN**

10/3,K/12 (Item 1 from file: 73)  
DIALOG(R)File 73:EMBASE  
(c) 2004 Elsevier Science B.V. All rts. reserv.

10876332 EMBASE No: 2000356260

**Bioeffects of nonionising radiation: \*Extremely\* \*low\*-\*frequency\*  
\*electromagnetic\* fields**

**BIOLOSKI UCINCI NEIONIZIRAJUCEG ZRACENJA: ELEKTROMAGNETSKA POLJA IZRAZITO  
NISKIH FREKVENCIJA**

**Busljeta I.; Gomzi M.; Trosic I.**

**Dr. I. Busljeta, Institut za medicinska istrazivanje, medicinu rada, p.p. 291, 10001 Zagreb Croatia**

**AUTHOR EMAIL: Ivana.Busljeta@imi.hr**

**Arhiv za Higijenu Rada i Toksikologiju ( ARH. HIG. RADA TOKSIKOL. ) ( Croatia) 2000, 51/1 (35-51)**

**CODEN: AHRTA ISSN: 0004-1254**

**DOCUMENT TYPE: Journal; Review**

**LANGUAGE: SERBOCROATIAN SUMMARY LANGUAGE: ENGLISH; SERBOCROATIAN**

**NUMBER OF REFERENCES: 125**

**Bioeffects of nonionising radiation: \*Extremely\* \*low\*-\*frequency\*  
\*electromagnetic\* fields**

...extremely low frequencies (up to 300 Hz) and increased risk of

leukemia and brain tumor children and adults. In addition, the risk of breast \*cancer\* in occupationally exposed population has increased. Laboratory studies on animal models, in vitro systems, and human volunteers did not confirm this connection. There is a...

MEDICAL DESCRIPTORS:

radiation exposure; electromagnetic radiation; electric field; magnetic field; leukemia--epidemiology--ep; brain tumor--epidemiology--ep; breast \*cancer\*--epidemiology--ep; \*cancer\* risk; degenerative disease; Alzheimer disease; dementia; amyotrophic lateral sclerosis; cardiovascular disease; heart arrhythmia; acute heart infarction; mental disease; medical research; human; \*review\*

SECTION HEADINGS:

016 \*Cancer\*

046 Environmental Health and Pollution Control

10/3,K/13 (Item 2 from file: 73)

DIALOG(R)File 73:EMBASE

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07846885 EMBASE No: 1999320235

**The design, construction and calibration of a carefully controlled source for exposure of mammalian cells to \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields**

Wolff H.; Gamble S.; Barkley T.; Janaway L.; Jowett F.; Halls J.A.T.; Arrand J.E.

J.E. Arrand, Department Biology and Biochemistry, Brunel University, Uxbridge, Middlesex UB8 3PH United Kingdom

Journal of Radiological Protection ( J. RADIOL. PROT. ) (United Kingdom) 1999, 19/3 (231-242)

CODEN: JRPRE ISSN: 0952-4746

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

NUMBER OF REFERENCES: 22

**The design, construction and calibration of a carefully controlled source for exposure of mammalian cells to \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* fields**

Despite some epidemiological evidence for an association between increased risk of \*cancer\* and exposure to electromagnetic fields (EMFs), \*cancer\* causation by such exposure remains unproven. Furthermore, for reasons such as biological unresponsiveness of the chosen system, poor equipment design and experimental confounders, no reproducible...

MEDICAL DESCRIPTORS:

mammal cell; equipment; \*cancer\* risk; technique; calibration; cell culture ; nonhuman; animal cell; \*review\*; priority journal

10/3,K/14 (Item 3 from file: 73)

DIALOG(R)File 73:EMBASE

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07247810 EMBASE No: 1998138164

**Melatonin: Receptor-mediated events that may affect breast and other steroid hormone-dependent cancers**

Baldwin W.S.; Barrett J.C.

J.C. Barrett, Lab. of Molecular Carcinogenesis, Natl. Inst. of Envntl.

Hlth. Sciences, P.O. Box 12233, Research Triangle Park, NC 27709 United States

Molecular Carcinogenesis ( MOL. CARCINOGEN. ) (United States) 1998, 21/3 (149-155)

CODEN: MOCAE ISSN: 0899-1987

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

NUMBER OF REFERENCES: 46

Epidemiological studies have suggested a possible link between **\*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields (EMFs)** and increased rates of certain cancers. One **\*cancer\*** that has been postulated to be associated with EMF exposure is breast **\*cancer\***, for which increased rates have been reported among electricians. These **\*cancer\*** associations are weak, and the link to EMF exposures remains tenuous. Understanding the mechanisms by which EMFs could have biological effects will help in elucidating...

...levels by EMFs. This hypothesis suggests that loss of melatonin affects a variety of hormonal processes such as estrogen homeostasis and thereby may increase breast **\*cancer\*** rates. Since this theory was first presented, putative melatonin receptors have been cloned, providing new tools with which to examine melatonin's mechanism of action...

...lymphocytes. This Working Hypothesis briefly reviews our current knowledge of melatonin receptors and then provides theories on how the inactivation of melatonin receptors may cause **\*cancer\*** and suggests areas of research for addressing this question.

MEDICAL DESCRIPTORS:

**\*breast \*cancer\*--etiology--et; \*hormone dependence breast carcinogenesis; electromagnetic field; \*cancer\* risk; occupational exposure; hormone blood level; homeostasis; \*cancer\* growth; hormone receptor interaction; receptor affinity; immunoregulation; b lymphocyte; human; \*review\*; priority journal**

SECTION HEADINGS:

016 **\*Cancer\***

10/3,K/15 (Item 4 from file: 73)

DIALOG(R)File 73:EMBASE

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07056984 EMBASE No: 1997338828

**Epidemiological studies concerned with exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and the risk of \*cancer\***

Stather J.W.

J.W. Stather, Natl. Radiological Protection Board, Chilton, Didcot OX11 0RQ United Kingdom

Radiation Protection Dosimetry ( RADIAT. PROT. DOSIM. ) (United Kingdom) 1997, 72/3-4 (291-303)

CODEN: RPDOD ISSN: 0144-8420

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

NUMBER OF REFERENCES: 50

**Epidemiological studies concerned with exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and the risk of \*cancer\***

Extensive epidemiological studies have been carried out in recent years to examine the possible effects of exposure to **\*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields** on the development of **\*cancer\***. In some studies, both residential and occupational, a number of cancers, in particular leukaemia and brain **\*cancer\***, have occurred at an increased incidence at higher levels of exposure. In general, however, no consistent and coherent pattern of results has been obtained and no clear evidence of a **\*cancer\*** risk has been demonstrated. A better understanding of any effect of electromagnetic fields on the development of **\*cancer\*** must await the results of more informative epidemiological studies and an improved understanding of the mechanisms by which these fields may interact with the body...

MEDICAL DESCRIPTORS:

**\*\*cancer\* risk; \*electromagnetic field brain \*cancer\*--epidemiology--ep; \*cancer\*--epidemiology--ep; \*cancer\* --etiology--et; environmental exposure; human; leukemia--epidemiology--ep; occupational exposure; \*review\***

SECTION HEADINGS:

014 Radiology  
016 \*Cancer\*  
017 Public Health, Social Medical and Epidemiology  
035 Occupational Health and Industrial Medicine  
046 Environmental Health and Pollution Control

10/3,K/16 (Item 5 from file: 73)

DIALOG(R)File 73:EMBASE

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06744683 EMBASE No: 1997026159

**Occupational exposure to electromagnetic fields and adult leukaemia: A  
\*review\* of the epidemiological evidence**

Feychting M.

M. Feychting, Institute of Environmental Medicine, Karolinska Institute,  
PO Box 210, S-171 77 Stockholm Sweden

Radiation and Environmental Biophysics ( RADIAT. ENVIRON. BIOPHYS. ) (   
United States) 1996, 35/4 (237-242)

CODEN: REBPA ISSN: 0301-634X

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

NUMBER OF REFERENCES: 32

**Occupational exposure to electromagnetic fields and adult leukaemia: A  
\*review\* of the epidemiological evidence**

The relationship between occupational exposure to \*extremely\* \*low\*  
\*frequency\* \*electromagnetic\* fields and adult leukaemia has been studied  
extensively during the last decade. The first studies were based on crude  
exposure assessments, estimated through job titles...

...methods might have diluted the effect estimates, and that improvement of  
the methods used for exposure assessment would result in more consistent  
associations. The present \*review\* emphasises the latest studies with  
considerably improved exposure assessments, as well as the control of  
confounding factors. Results from studies where exposure was assessed  
through...

**MEDICAL DESCRIPTORS:**

\*cancer\* risk; electromagnetic field; human; occupational exposure;  
radiation carcinogenesis; \*review\*

**SECTION HEADINGS:**

016 \*Cancer\*

027 Biophysics, Bioengineering and Medical Instrumentation

046 Environmental Health and Pollution Control

10/3,K/17 (Item 6 from file: 73)

DIALOG(R)File 73:EMBASE

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06353872 EMBASE No: 1996012994

**Biological effects of electromagnetic fields**

Shimizu H.; Suzuki Y.; Okonogi H.

Public Health/Envntl. Medicine Dept., Jikei University School of Medicine,  
3-25-8, Nishishinbashi, Minato-ku, Tokyo 105 Japan

Japanese Journal of Hygiene ( JPN. J. HYG. ) (Japan) 1995, 50/5  
(919-931)

CODEN: NEZAA ISSN: 0021-5082

DOCUMENT TYPE: Journal; Review

LANGUAGE: JAPANESE SUMMARY LANGUAGE: ENGLISH; JAPANESE

Since several epidemiological studies have indicated an elevated risk for  
certain types of \*cancer\* in both living and working environments where  
exposure to an \*extremely\* \*low\*-\*frequency\* \*electromagnetic\* field (ELF)  
occurs, public concern about ELF has been increasing because it is  
impossible to imagine life today without electricity. We reviewed studies  
on biological...

...of ELF exposure on mammalian reproduction and development, but several suggest such effects. 4) Reported evidence does not demonstrate that the ELF acts as a \*cancer\* initiator. However, it might act as a promotor or affect tumor progression. Further observations and epidemiological studies of ELF must be accompanied by laboratory experiments...

MEDICAL DESCRIPTORS:

animal experiment; \*cancer\* risk; cell proliferation; growth regulation; macaca; nonhuman; \*review\*; risk assessment; tumor promotion

SECTION HEADINGS:

016 \*Cancer\*

046 Environmental Health and Pollution Control

10/3,K/18 (Item 7 from file: 73)

DIALOG(R)File 73:EMBASE

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06336611 EMBASE No: 1995372795

**Conformal radiation therapy with fixed shaped coplanar or noncoplanar radiation beam bouquets: A possible alternative to radiosurgery**

Marks L.B.; Sherouse G.W.; Das S.; Bentel G.C.; Spencer D.P.; Turner D.  
Department of Radiation Oncology, Duke University Medical Center, Box 3085, Durham, NC 27710 United States

International Journal of Radiation Oncology Biology Physics ( INT. J. RADIAT. ONCOL. BIOL. PHYS. ) (United States) 1995, 33/5 (1209-1219)

CODEN: IOBPD ISSN: 0360-3016

DOCUMENT TYPE: Journal; Conference Paper

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

...have a clear physical and geometric advantage over fixed fields for small spherical targets, those advantages are reduced for large or irregularly shaped targets where \*static\* \*fields\* can be individually shaped. We have developed a system that allows efficient and flexible design and reliable delivery of customized 'bouquets' of fixed nonopposed coplanar...

...clinical deterioration 2 to 4 weeks following treatment. One had increased edema on scans and responded to steroids. Six patients clinically improved following radiation therapy. \*Review\* of alternative treatment plans reveals that the relative utility of coplanar vs. noncoplanar beams is likely dependent on the location of the lesion. Noncoplanar beam...

MEDICAL DESCRIPTORS:

\*cancer\* radiotherapy; conference paper; human; priority journal; radiation dose; radiation dose fractionation; radiation hazard; radiosurgery

SECTION HEADINGS:

008 Neurology and Nerosurgery

014 Radiology

016 \*Cancer\*

10/3,K/19 (Item 8 from file: 73)

DIALOG(R)File 73:EMBASE

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06262996 EMBASE No: 1995290193

**Exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and the risk of malignant diseases - An evaluation of epidemiological and experimental findings**

Hardell L.; Holmberg B.; Malker H.; Paulsson L.-E.

Department of Oncology, Orebro Medical Centre, S-701 85 Orebro Sweden  
European Journal of Cancer Prevention ( EUR.J. CANCER PREV. ) (United Kingdom) 1995, 4/SUPPL. 1 (3-107)

CODEN: EJUPE ISSN: 0959-8278

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

**Exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and the risk of malignant diseases - An evaluation of epidemiological and experimental findings**

Epidemiological and experimental studies concerning \*extremely\* \*low\* \*frequency\* \*electromagnetic\* field exposure and malignant diseases published up to 1 July 1994 were evaluated to assess the possible carcinogenicity of electromagnetic fields and the scientific basis...  
...their residence, (iii) an increased risk of chronic lymphatic leukaemia and occupational exposure to low frequency electromagnetic fields and (iii) an increased risk of breast \*cancer\*, malignant melanoma of the skin, nervous system tumours, non-Hodgkin lymphoma, acute lymphatic leukaemia or acute myeloid leukaemia and certain occupations. There is no scientific...

**MEDICAL DESCRIPTORS:**

**\*\*cancer\*--etiology--et; \*\*cancer\*--epidemiology--ep; \*childhood leukemia--etiology--et; \*childhood leukemia--epidemiology--ep; \*electromagnetic field; \*leukemia--etiology--et; \*leukemia--epidemiology--ep adult; \*cancer\* risk; child; human; priority journal; \*review\***

**SECTION HEADINGS:**

007 Pediatrics and Pediatric Surgery  
016 \*Cancer\*  
025 Hematology  
027 Biophysics, Bioengineering and Medical Instrumentation  
035 Occupational Health and Industrial Medicine  
046 Environmental Health and Pollution Control  
017 Public Health, Social Medical...

10/3,K/20 (Item 9 from file: 73)

DIALOG(R)File 73:EMBASE

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06078472 EMBASE No: 1995108956

**Carcinogenic risk due to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields: State of the art**

RISCHIO CANCEROGENO DA CAMPI ELETTROMAGNETICI ELF: STATO DELL'ARTE  
Pira E.; Zanetti C.; Saia B.  
Dipartimento di Traumatol. Ortopedia, Medicina del Lavoro, Università degli Studi, Torino Italy  
Medicina del Lavoro ( MED. LAV. ) (Italy) 1994, 85/6 (447-462)  
CODEN: MELAA ISSN: 0025-7818  
DOCUMENT TYPE: Journal; Review  
LANGUAGE: ITALIAN SUMMARY LANGUAGE: ENGLISH; ITALIAN

**Carcinogenic risk due to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields: State of the art**

...residential exposure to ELF electromagnetic fields at levels slightly above ambient background. There are several suggestions that such an exposure may increase the risk of \*cancer\*, but these studies failed to provide conclusive indications. The present state of uncertainty led to a variety of recommendations and statements being made concerning restrictions to the exposure of people to ELF electromagnetic fields. Attempts to detect direct chromosomal damage from ELF electromagnetic fields have proven negative, while results on \*cancer\* promotion have been controversial. On the basis of several epidemiological studies on occupational exposure, an increased risk of leukemia, brain \*cancer\* and male breast \*cancer\* is apparent; the literature on residential exposure provides some evidence of an effect on childhood \*cancer\*, especially leukemia; however, when interpreting these results some major methodological concerns should be kept in mind. In conclusion, the public concern and potential public health...

**MEDICAL DESCRIPTORS:**

**\*\*cancer\*--etiology--et; \*\*cancer\*--epidemiology--ep; \*electromagnetic field; \*occupational exposure brain tumor--etiology--et; brain tumor--epidemiology--ep; breast \*cancer\*--epidemiology--ep; breast \*cancer\*--etiology--et; \*cancer\* risk; childhood**

\*cancer\*--etiology--et; childhood \*cancer\*--epidemiology--; human;  
leukemia--epidemiology--ep; leukemia--etiology--et; male breast; \*review\*

SECTION HEADINGS:

016 \*Cancer\*

035 Occupational Health and Industrial Medicine

10/3,K/21 (Item 10 from file: 73)

DIALOG(R)File 73:EMBASE

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06010443 EMBASE No: 1995039099

**Melatonin suppression by static and \*extremely\* \*low\* \*frequency\*  
\*electromagnetic\* fields: Relationship to the reported increased incidence  
of \*cancer\***

Reiter R.J.

Dept Cellular Structural Biology, The Univ Texas Health Science Center,  
7703 Floyd Curl Drive, San Antonio, TX 78284-7762 United States

Reviews on Environmental Health ( REV. ENVIRON. HEALTH ) (Israel) 1994,  
10/3-4 (171-186)

CODEN: REVHA ISSN: 0048-7554

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

**Melatonin suppression by static and \*extremely\* \*low\* \*frequency\*  
\*electromagnetic\* fields: Relationship to the reported increased incidence  
of \*cancer\***

An increased \*cancer\* incidence has been reported in individuals living  
and/or working in an environment in which they are exposed to higher than  
normal artificial electromagnetic fields...

...and extremely low frequency magnetic fields also reduces melatonin  
levels. Melatonin is a potent oncostatic agent and it prevents both the  
initiation and promotion of \*cancer\*. Reduction of melatonin, at night, by  
any means, increases cells' vulnerability to alteration by carcinogenic  
agents. Thus, if in fact artificial electromagnetic field exposure  
increases the incidence of \*cancer\* in humans, a plausible mechanism could  
involve a reduction in melatonin which is the consequence of such  
exposures.

MEDICAL DESCRIPTORS:

\*\*cancer\* incidence; \*electromagnetic field; \*hormone synthesis  
brain; \*cancer\*--prevention--pc; circadian rhythm; environmental exposure;  
hormone blood level; hormone determination; human; light; male; night;  
nonhuman; occupational exposure; pineal body; \*review\*

SECTION HEADINGS:

003 Endocrinology

016 \*Cancer\*

017 Public Health, Social Medical and Epidemiology

035 Occupational Health and Industrial Medicine

046 Environmental Health and Pollution Control

052 Toxicology

10/3,K/22 (Item 11 from file: 73)

DIALOG(R)File 73:EMBASE

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05345070 EMBASE No: 1993113155

**Biological effects of \*extremely\* \*low\* \*frequency\* \*electromagnetic\*  
fields: In vivo studies**

Anderson L.E.

Bioelectromagnetics, Battelle, Pacific Northwest Laboratory, P.O. Box  
999, Richland, WA 99352 United States

American Industrial Hygiene Association Journal ( AM. IND. HYG. ASSOC. J.  
) (United States) 1993, 54/4 (186-196)

CODEN: AIHAA ISSN: 0002-8894

DOCUMENT TYPE: Journal; Review



**Biological effects of \*extremely\* \*low\*--\*frequency\* \*electromagnetic\* fields: In vivo studies**

This paper discusses the biological effects of exposure to \*extremely\* \*low\* \*frequency\* \*electromagnetic\* fields observed in animal studies. Three areas of investigation are reported: (1) studies on the nervous system, including behavior and neuroendocrine function; (2) experiments on \*cancer\* development in animals; and (3) measurements of currents and electric fields induced in animal models by exposure to external magnetic fields. An attempt is made...

**MEDICAL DESCRIPTORS:**

animal behavior; biological rhythm; carcinogenesis; cardiovascular system; in vivo study; mutagenesis; neurochemistry; neuroendocrine system; neurophysiology; nonhuman; priority journal; reproduction; \*review\*

10/3,K/23 (Item 12 from file: 73)

DIALOG(R)File 73:EMBASE

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05001508 EMBASE No: 1992141724

**\*Extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and \*cancer\*: The epidemiologic evidence**

Bates M.N.

United States

Environmental Health Perspectives ( ENVIRON. HEALTH PERSPECT. ) (United States) 1991, 95/- (147-156)

CODEN: EVHPA ISSN: 0091-6765

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH SUMMARY LANGUAGE: ENGLISH

**\*Extremely\* \*low\* \*frequency\* \*electromagnetic\* fields and \*cancer\*: The epidemiologic evidence**

This paper reviews the epidemiologic evidence that low frequency electromagnetic fields generated by alternating current may be a cause of \*cancer\*. Studies examining residential exposures of children and adults and studies of electrical and electronics workers are reviewed. Using conventional epidemiologic criteria for inferring causal associations...

**MEDICAL DESCRIPTORS:**

\*brain \*cancer\*--etiology--et; \*brain \*cancer\*--epidemiology--ep; \*carcinogenicity; \*childhood \*cancer\*--etiology--et; \*childhood \*cancer\*--epidemiology--ep; \*electromagnetic field; \*leukemia--etiology--et; \*leukemia--epidemiology--ep; \*occupational exposure human; \*review\*

**SECTION HEADINGS:**

016 \*Cancer\*

046 Environmental Health and Pollution Control

10/3,K/24 (Item 13 from file: 73)

DIALOG(R)File 73:EMBASE

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04501944 EMBASE No: 1990393472

**Exposure of cells to \*extremely\* \*low\*--\*frequency\* \*electromagnetic\* fields: Relationship to \*malignancy\*?**

Goodman R.; Shirley-Henderson S.

Department of Pathology, Columbia University Health Sciences, New York, NY United States

Cancer Cells ( CANCER CELLS ) (United States) 1990, 2/11 (355-359)

CODEN: CACEE ISSN: 1042-2196

DOCUMENT TYPE: Journal; Review

LANGUAGE: ENGLISH